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A new species of *Zenopsis* (Zeiformes: Zeidae) from the South China Sea, East China Sea and off Western Australia

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Abstract Nakabo T., Bray D.J. and Yamada U. 2006. A new species of *Zenopsis* (Zeiformes: Zeidae) from the South China Sea, East China Sea and off Western Australia. *Memoirs of Museum Victoria* 63(1): 91–96.

Zenopsis stabilispinosa sp. nov. is described from the South China Sea, East China Sea and off Western Australia. It differs from other species of *Zenopsis* in having the third anal-fin spine fused to its pterygiophore, seven dorsal-fin spines, a short pelvic fin in adults, and 32 (13+19) vertebrae. A key to the species of *Zenopsis* is provided.

Keywords Zeidae, *Zenopsis*, new species, South China Sea, Western Australia

Introduction

The species of *Zenopsis* are characterized by having a deep strongly compressed silvery body, scales absent from the body except along the lateral line, concave dorsal head profile, enlarged bucklers along most of the spinous dorsal-fin base and along the soft dorsal- and anal-fin bases, three anal-fin spines, six pelvic-fin elements, and narrow infraorbitals. Three species of *Zenopsis* are currently recognized: *Z. nebulosa* Temminck and Schlegel, 1845, *Z. conchifer* Lowe, 1852 and *Z. oblonga* Parin, 1989. During surveys of demersal fishes in the South China Sea and off Western Australia, ten specimens of *Zenopsis* which differ significantly from these three *Zenopsis* species were collected. They are described herein as a new species.

Material and methods

Museum abbreviations follow Leviton et al., 1985, with the exception of the following: SNFR – Seikai National Fisheries Research Institute. Counts and measurements (Tables 1 and 2) follow Nakabo, 2002a. Vertebral numbers and anal-fin pterygiophore configurations were obtained from radiographs.

Zenopsis stabilispinosa sp. nov.

Figures 1–3A, 4, Tables 1–2

Zenopsis sp. nov. Bray, 1983: 106, fig. 16; *Zenopsis* sp. (off Western Australia): Williams et al., 1996: 150 (off Western Australia), Tyler et al., 2003: 2 (South China Sea and off Western Australia).

Material examined. Holotype. FAKU 64803 (307.2 mm SL), South China Sea, 19°45.0'N, 114°04.0'E, 457–767 m, JAMARC (Japan Marine Fishery Resource Research Center), 20 Jun, 1991.

Paratypes. FAKU 64804 (410.1 mm SL), South China Sea, 19°47.0'N, 114°05.0'E, 465–505 m, JAMARC, 21 Jun 1991; AMS I.22826-004 (206.1 mm SL), North-west Shelf, Western Australia 210 km NW of Port Hedland, 18°44'S, 117°02'E, 396–406 m, J. R. Paxton, CSIRO RV *Soela*, 13 Apr, 1982; AMS I.31146-001 (2, 100.2–103.3 mm SL), off North-west Cape, Western Australia, 21°37.9'S, 113°59.3'E, 209–215 m, J. R. Paxton, CSIRO RV *Southern Surveyor*, 24 Jan, 1991; AMS I.31147-002 (3, 80.4–104.5 mm SL), off North-west Cape, Western Australia, 21°44.5'S, 113°52.5'E, 290–320 m, J. R. Paxton, CSIRO RV *Southern Surveyor*, 24 Jan, 1991; ASIZ P.0057609, off Donggang, Pintung, Taiwan, 22 28 12 N, 120 25 48 E, K. T. Shao, 8 Oct, 1985; ASIZ P.0060011, fish market, Dahsi, Ylian, Taiwan, 24 57 00 N, 121 52 48 E, B. H. Gao, 10 Aug, 1997.

Diagnosis. *Zenopsis stabilispinosa* differs from its congeners in the following combination of characters: dorsal fin with 7 spines; anal fin with first 2 spines movable and 3rd spine immovable, fused with its pterygiophore; pelvic fin short, 1.69–1.79 in HL, in adult specimens greater than 300 mm SL; bony bucklers along bases of spinous and soft-rayed portions of dorsal fin 3–4+5–6; bucklers along ventral body margin anterior to pelvic fin and between pelvic- and anal-fin origins, and along anal-fin base 5–6+6–7+5–6 and vertebrae 32 (13 abdominal + 19 caudal).

Description. (values for paratypes in parentheses if different from holotype). Dorsal fin VII, 26; anal fin III, 23; pectoral fin rays 12 (12–13); gill rakers 3+9 (3–4+8–10); dorsal bucklers

Figure 1. *Zenopsis stabilispinosa* sp. nov. Holotype, FAKU 64803 (307.2 mm SL).

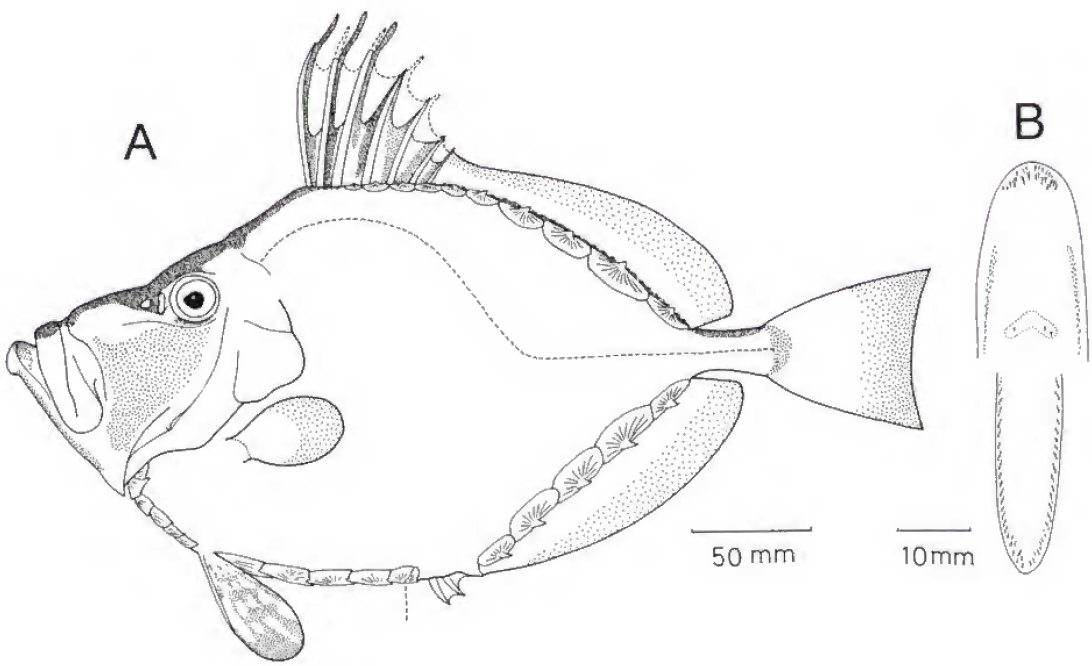

Figure 2. Diagrammatic figure (A), and teeth on jaws and vomer (B) of the holotype of *Zenopsis stabilispinosa* sp. nov., FAKU 64803.

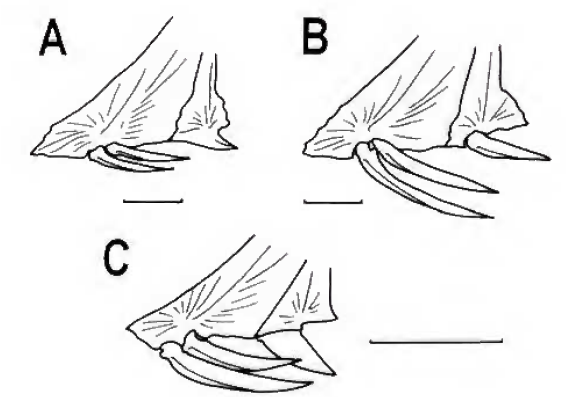

Figure 3. Diagrammatic figures of anal-fin pterygiophores and spines of 3 species of *Zenopsis*: A, *Z. stabilispinosa*, holotype, FAKU 64803 (307.2 mm SL); B, *Z. nebulosa*, FAKU 64805 (379 mm SL); C, *Z. conchifer*, RUSI 14070 (135.5 mm SL). Scales indicate 10 mm.

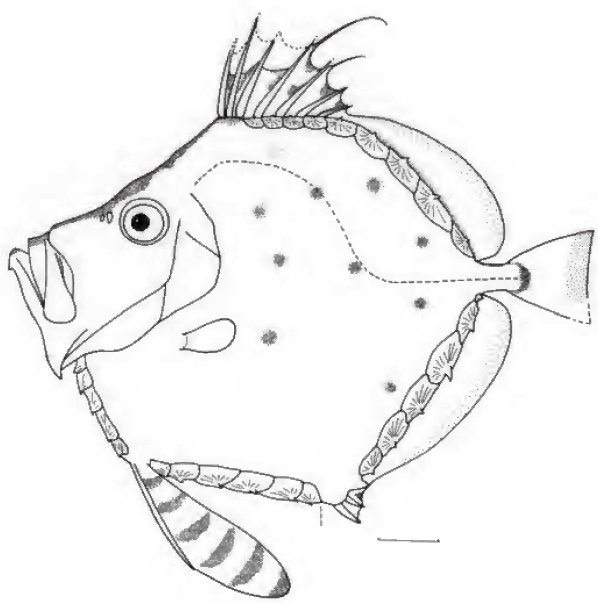

Figure 4. Diagrammatic figure of a juvenile of *Zenopsis stabilispinosa*, AMS I.31147-002 (80.4 mm SL), paratype.

4+6 (3–4+5–6); ventral bucklers 6+6+5 (5–6+6–7+5–6); vertebrae 13+19. Body deep, strongly compressed, scales absent except along lateral line. Head strongly compressed, dorsal profile slightly concave. Nostrils located just before eye; anterior nostril rounded, posterior nostril oblong. Mouth large, strongly oblique; upper jaw extremely protrusible. Teeth in upper jaw in 2 separate bands; anterior band with 3 irregular rows of small caniform teeth, inner teeth larger than outer ones; posterior band very narrow, long with minute caniform teeth. Lower jaw with 2 irregular rows of small caniform teeth; 2 teeth on inner row of anteriormost part larger than other teeth. Vomer with 1 small caniform tooth on right side, 2 small caniform teeth on left side (with 0–3 caniform teeth on right side, 0–7 on left side; mode 2 on both sides). Palatine toothless. Tongue thick, long and pointed. Gill-rakers on 1st gill-arch short. Pseudobranchiae well-developed. Lateral line arched below spinous portion of dorsal fin, following midline axis of body from below anterior one-third of soft dorsal fin, to caudal-fin base. Caudal peduncle moderately long, narrow. Dorsal-fin origin vertically to almost vertically above posterior tip of operculum; anterior dorsal-fin spines long with filamentous membranes; soft dorsal fin convex, rays increasing in length to 18th ray. Anal fin origin near vertical through notch between spinous and soft-rayed portions of dorsal fin; 1st and 2nd anal-fin spines small, movable, 3rd spine immovable (fused with pterygiophore); 2nd and 3rd anal-fin spines and 1st anal-fin ray connected by membrane; soft anal fin convex, rays increasing in length to about 16th ray. Pectoral fin rounded, reaching to vertical below bases of 4th and 5th dorsal-fin spines. Pelvic fin relatively short, 1.69 in HL (1.79 in paratype 324.4 mm SL, but somewhat longer, 0.98–1.26 in HL, in juvenile paratypes 80.4–206.1 mm SL), origin anterior to vertical through pectoral-fin base, fin not reaching anus when depressed (extending to anus in paratypes less than 105 mm SL). Caudal fin slightly emarginate.

4 (3–4) bony bucklers along base of spinous dorsal fin and 6 (5–6) bony bucklers along soft dorsal-fin base; each buckler with a dorsal spine. 6 (5–6) bony bucklers anterior to pelvic-fin base. 6 (6–7) bony bucklers with posterior spine between origins of pelvic and anal fins. Bucklers absent from base of anal-fin spines. 6 (5–6) bony bucklers, each with a vertical spine, along base of soft anal fin.

Colour when fresh. Body silver (with many dark spots in juvenile paratypes less than 105 mm SL). Dorsal margin of head and body dark-brown from snout to caudal peduncle. Spinous dorsal fin with a transverse broad dark-brown band on membrane; soft dorsal fin dusky distally, white basally. Anal fin dusky distally, white basally. Pectoral fin pale basally, dusky distally, with a small dark-brown spot dorsally on fin base. Pelvic fin with 4 irregular black bands (6–7 dark bands in juvenile paratypes less than 105 mm SL). Caudal fin with dark semicircular mark on base and broad dark band on posterior margin.

Etymology. The specific name, *stabilispinosa*, refers to the fused anal-fin spine.

We recommend that the standard name for this species be the Fixed-spine Mirror Dory.

Table 1. Selected meristics for species of Zenopsis

	Z. stabilispinosa		*Z. nebulosa*	*Z. conchifer*	*Z. oblonga*
	Holotype	Paratypes			
No. specimens	1	9	6	8	
Dorsal fin	VII, 26	VII, 27	IX, 27	IX-X, 24–26	VIII-X, 27–29
Anal fin	III, 23	III, 23	III, 25–26	III, 25–26	III, 25–27
Pectoral fin	12	12–13	12–13	12	11–13
Pelvic fin	6	6	6	6	6
Gill rakers (upper + lower)	3 + 9	3–4 + 8–10	3–4 + 7–9	2–3 + 8–10	
Vertebrae (AV + CV)	32 (13 + 19)	32 (13 + 19)	35(13 + 22)	34–36(13 + 21–23)	36
Dorsal bony bucklers*	4 + 6	3–4 + 5–6	5–7 + 6–7	2–3 + 5	6–7 + 8–9
Ventral bony bucklers**	6 + 6 + 5	5–6 + 6–7 + 5–6	5–6 + 7–9 + 8–10	1–3 + 6–8 + 5–6	2–3 + 7–8 + 9–11

* along spinous and soft dorsal-fin bases
**anterior to pelvic fin + between pelvic fin and anal fin + along anal-fin base

Relationships. *Zenopsis stabilispinosa* differs from *Z. nebulosa, Z. conchifer* and *Z. oblonga* in having the first two anal-fin spines movable and a third fused to the pterygiophore (versus three movable anal-fin spines in the other three species; in some specimens of *Z. conchifer* the third anal-fin spine is more or less fixed, but is not fused with the pterygiophore, fig. 3C). As the movable third anal-fin spine is based on the second anal pterygiophore in the latter three species (fig. 3B), it is likely that the spine-like posterior process projecting from the third anal pterygiophore of *Z. stabilispinosa* represents the third anal-fin spine fused to its pterygiophore (fig. 3A). Fused anal-fin spines have previously been reported in two other zeiform families: family Parazenidae – *Cyttopsis rosea* Lowe, 1843, and family Cyttidae – *Cyttus novaezelandiae* Arthur, 1885 and *C. traversi* Hutton, 1872 (Bray, 1983, Heemstra, 1980, Tyler et al., 2003).

Zenopsis stabilispinosa also differs from its congeners in having seven dorsal-fin spines (versus eight to ten dorsal-fin spines), 19 caudal vertebrae (versus 22–23 caudal vertebrae) and a smaller pelvic fin, 1.69–1.79 in HL in specimens greater than 300 mm SL of *Z. stabilispinosa* (versus almost the same as or more than HL in other species).

Zenopsis stabilispinosa is similar to *Z. nebulosa* in having five to six ventral bony bucklers anterior to the pelvic fin (versus two to three bucklers in *Z. conchifer* and *Z. oblonga*). *Zenopsis stabilispinosa* and *Z. conchifer* resemble *Z. conchifer* in lacking ventral bony bucklers along the anal-fin spines (versus having one to two ventral bony bucklers in *Z. nebulosa* and *Z. oblonga*).

Remarks. Opinion differs regarding whether the first pelvic-fin element in *Zenopsis* is a spine or a ray. Here, we follow Tyler et al., 2003 in regarding the first pelvic-fin element as a ray because it is completely divided throughout its entire length, despite being neither segmented nor branched.

Key to the species of *Zenopsis*

1a) Dorsal-fin spines 7; 3rd anal-fin spine immovable (fused to pterygiophore); caudal vertebrae 19 ..... *Z. stabilispinosa* sp. nov.
1b) Dorsal-fin spines 8–10; 3rd anal-fin spine movable (not fused to pterygiophore); caudal vertebrae 21–23 2
2a) Bony bucklers along spinous portion of dorsal-fin base 1–3; bucklers absent from base of anal-fin spines ..... *Z. conchifer*
2b) Bony bucklers along spinous dorsal-fin base 5–7; 1–2 bony bucklers along base of anal-fin spines 3
3a) Bony bucklers on ventral margin anterior to pelvic-fin base 5–6 ..... *Z. nebulosa*
3b) Bony bucklers on ventral margin anterior to pelvic-fin base 2–3 ..... *Z. oblonga*

Comparative material examined

Zenopsis conchifer: RUSI (J. L. B. Smith Institute of Ichthyology) 13801, (3, 65.6–135.8 mm SL), Kenya, Malindi, 3°04'S, 40°25'E, P. C. Heemstra, 17 Nov 1980; RUSI 14070 (5, 84.8–135.5 mm SL), Kenya, Ras Ngomeni, 2°50'S, 40°34'E, P. C. Heemstra, 12 Dec 1980. *Zenopsis nebulosa*: FAKU 64805, SNFR 1068 (313–381 mm SL), East China Sea, 30°49'9N, 128°56'2E, 355–379 m, SNFR, 26 Oct 1991; SNFR 336, 1610, 1611, (86–152 mm SL), East China Sea, 32°12'7N, 127°34'7E, 117 m, SNFR, 14 Oct 1982; SNFR 1066 (232 mm SL), East China Sea, 29°14'7N, 127°34'7E, 408 m, SNFR, 2 Oct 1989. *Zenopsis oblonga*: USNM 285048, E. Pacific, Nazca Ridge, 25°39'S, 85°37'W, 210 m (paratype); USNM 353898, SE Pacific, Sala-Y-Gomez Ridge, 25°02S, 97.48°W, 330 m, N. Parin et al., 3 May 1987.

Table 2. Measurements of *Zenopsis stabilispinosa* sp. nov. Measurements are in mm; proportions (% SL) in parentheses.

	Holotype		Paratypes																	
Catalog no.	FAKU 64803		FAKU 64804		AMS I.22826-004		AMS I.31146-001		AMS I.31146-001		AMS I.31147-002		AMS I.31147-002		AMS I.31147-002		ASIZ P.0060011		ASIZ P.0057609	
		% SL		% SL		% SL		% SL		% SL		% SL		% SL		% SL		% SL		% SL
Total length	381.1		410.1		259.1		124.1		125.8		132.5		120.2		102.4		446.1		105.8	
Standard length (SL)	307.2		324.4		206.1		100.2		103.3		104.5		95.9		80.4		356.8		82.2	
Head length (HL)	110.9	36.1	123.8	38.2	75.1	36.4	41.6	41.5	39.7	38.4	41.1	39.3	38.5	40.1	32.1	39.9	130.8	36.7	33.7	41.1
Body depth	171.4	55.8	179.0	55.2	125.7	61.0	71.7	71.6	75.8	73.5	76.2	72.9	69.6	72.6	64.0	79.6	194.4	54.5	63.5	77.3
Body width	25.6	8.3	26.3	8.3	16.4	8.0	9.0	9.0	9.4	9.1	8.6	8.2	8.5	8.9	6.4	8.0	28.3	7.9	8.0	9.7
Predorsal length	119.9	39.0	133.8	41.2	88.9	43.1	45.1	45.0	44.8	43.4	48.3	46.2	41.7	43.5	35.8	44.5	134.6	37.7	17.5	21.3
Snout length	57.6	18.8	62.1	19.1	40.4	19.6	20.5	20.5	20.5	19.8	21.4	20.5	18.8	19.6	15.4	19.2	68.9	19.3	15.9	19.3
Eye diameter	21.7	7.1	23.6	7.3	17.3	8.4	9.8	9.8	9.0	8.7	10.0	9.6	9.3	97.0	8.1	10.1	26.2	7.3	8.7	10.6
Orbit diameter	23.4	7.6	25.7	7.9	17.7	8.6	10.5	10.5	9.9	9.6	10.4	10.0	9.6	20.0	8.6	10.7	27.8	7.8	9.3	11.3
Postorbital length	43.5	14.2	49.3	15.2	23.3	11.3	12.4	12.4	11.6	11.2	14.8	14.2	11.4	11.9	10.0	12.4	35.0	9.8	10.6	12.9
Interorbital length	17.7	5.6	17.6	5.4	14.2	6.9	7.8	7.8	8.0	7.7	8.3	7.9	7.4	7.7	6.4	8.0	20.4	5.7	6.8	8.3
Preanal length	195.5	63.5	218.8	67.4	138.1	67.0	75.6	75.0	78.5	76.0	77.5	74.2	73.4	76.5	65.0	80.8	225.9	63.3	55.7	67.8
Caudal peduncle depth	16.8	5.5	14.8	4.6	9.6	4.7	5.1	75.4	5.7	5.5	5.4	5.2	5.2	5.4	4.8	6.0	15.4	4.3	4.4	5.4
Caudal peduncle length	33.1	10.8	36.0	11.1	19.2	9.3	10.0	10.0	9.1	8.8	9.4	9.0	8.7	9.1	8.3	10.3	138.7	38.9	6.3	7.7
Pectoral-fin length	43.2	14.1	45.7	14.1	31.2	15.1	12.6	12.6	15.4	14.9	75.0	71.6	14.4	15.0	10.7	13.3	52.4	14.7	13.0	15.8
Pelvic-fin length	65.8	21.4	69.0	21.3	59.5	28.9	36.9	36.8	37.8	36.6	37.2	35.6	36.8	38.4	32.7	40.7	73.5	20.6	33.1	40.3
Caudal-fin length	66.6	21.7	70.0	21.6	47.9	23.2	20.2	20.2	23.2	22.5	23.3	22.3	23.4	24.4	18.8	23.4	73.3	20.5	21.5	26.2
1st dorsal-spine length	54.2	17.6	-	-	-	23.9	-	-	-	-	-	-	-	-	-	-	71.9	20.2	-	-
2nd dorsal-spine length	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3rd dorsal-spine length	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4th dorsal-spine length	-	-	-	-	-	-	18.0	18.0	-	-	-	-	16.4	17.1	-	-	-	-	-	-
5th dorsal-spine length	39.9	13.0	40.7	12.5	20.4	9.9	11.8	11.8	17.5	16.9	-	-	13.0	13.6	15.2	18.9	-	-	16.9	20.6
6th dorsal-spine length	24.1	7.8	22.0	6.8	14.0	6.8	9.2	9.2	-	-	12.8	12.2	7.7	8.0	11.5	14.3	31.3	8.8	-	-
7th dorsal-spine length	16.4	5.3	15.8	4.9	4.8	2.3	5.6	5.6	5.1	4.9	7.9	7.6	7.5	7.8	5.8	7.2	16.3	4.5	-	-
Longest dorsal-ray length	33.2	10.8	37.8	11.7	-	-	12.3	12.3	12.4	12.0	14.5	13.9	13.4	14.0	10.8	13.4	39.0	10.9	13.0	15.8
1st anal-spine length	19.1	4.6	13.9	4.3	9.3	4.5	8.6	8.6	8.0	7.7	-	-	7.8	8.1	7.6	9.4	17.0	4.8	7.5	9.1
2nd anal-spine length	13.1	4.3	12.5	3.9	7.1	3.4	6.8	6.8	4.4	4.3	8.9	8.5	4.4	4.6	6.2	7.7	13.3	3.7	4.9	6.0
3rd anal-spine length	8.1	2.6	10.4	3.2	8.3	4.0	4.3	4.3	5.6	5.4	5.9	5.6	5.2	5.4	4.7	5.8	12.7	3.6	3.5	4.3
Longest anal-ray length	34.6	11.3	37.3	11.5	17.3	8.4	10.9	10.9	11.5	11.1	12.1	11.6	12.5	13.0	10.0	12.4	38.3	10.7	11.4	13.9

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References

Arthur, W. 1885. Notes on New Zealand fishes. *Transactions of the New Zealand Institute* 17 (1884): 160–172, Pl. 14.

Bray, D. J. 1983. Revision of the fish family Zeidae. 184 pp. Unpublished Master's thesis, School of Biological Sciences, Macquarie University, Sydney, Australia.

Heemstra, P. C. 1980. A revision of the zeid fishes (Zeiformes: Zeidae) of South Africa. *Ichthyological Bulletin* (41): 1–18.

Hutton, F. W. 1872. *Fishes of New Zealand. Catalogue with diagnoses of the species*. Colonial Museum and Geological Survey Department. Wellington. Fishes New Zealand: 1–93 + 95–133, Pls. 1–12.

Leviton, A. E., Gibbs, R. H. Jr., Heal, E. and Dawson, C. E. 1985. Standards in herpetology and ichthyology. Part 1. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* 1985 (3): 802–832.

Lowe, R. T. 1852. An account of fishes discovered or observed in Madeira since the year 1842. *Proceedings of the Zoological Society of London* 1850 (pt 18): 247–253.

Nakabo, T. 2002a. Introduction to Ichthyology, p.xxi–xlii in: Nakabo, T. (ed.). *Fishes of Japan with pictorial keys to the species*, English edition. Tokai University Press: Tokyo.

Parin, N. V. 1989. *Zenopsis oblonga* sp. nov. (Zeidae, Osteichthyes) from the Nuska Ridge. *Zoologicheskii Zhurnal* 68(4): 150–153. (in Russian with English summary).

Temminck, C. J. and Schlegel, H. 1845. Pisces, Parts 7–9: 113–172, Pls. 1–143 + A, in: *Fauna Japonica*, sive descriptio animalium quae in itinere per Japoniam suscepto annis 1823–30 collegit, notis observationibus et adumbrationibus illustravit P. F. de Siebold.

Tyler, J. C., O'Toole, B. and Winterbottom, R. 2003. Phylogeny of the genera and families of zeiform fishes, with comments on their relationships with tetraodontiforms and caproids. *Smithsonian Contributions to Zoology*. 618: i–iv, 1–110.

Williams, A., Last, P. R., Gomon, M. F. and Paxton, J. R. 1996. Species composition and checklist of the demersal ichthyofauna of the continental slope off Western Australia (20–35°S). *Records of the Western Australian Museum*, 18: 135–155.